

## CLAIMS

1. A method of determining a write strategy for recording data on a medium comprising:

defining a set of variable write parameters;

5 generating a plurality of candidate write symbols that specify different values for the variable write parameters;

generating a plurality of readout waveforms produced by the plurality of candidate write symbols;

10 analyzing the readout waveforms produced by the marks to determine a set of distinguishable readout waveforms; and

selecting selected ones of the plurality of candidate write symbols that correspond to the distinguishable readout waveforms to be included in a set of write symbols that are suitable for mapping to data for the purpose or writing data to the medium.

15 2. A recording medium having data blocks written on it wherein the data blocks are written using a set of write symbols determined by:

defining a set of variable write parameters;

generating a plurality of candidate write symbols that specify different values for the variable write parameters;

20 generating a plurality of readout waveforms produced by the plurality of candidate write symbols;

analyzing the readout waveforms produced by the marks to determine a set of distinguishable readout waveforms; and

25 selecting selected ones of the plurality of candidate write symbols that correspond to the distinguishable readout waveforms to be included in a set of write symbols that are suitable for mapping to data for the purpose or writing data to the medium.

3. A method of recording data on a recording medium comprising:

mapping the data to a set of write symbols wherein each write symbol represents more than one bit of the data and wherein the set of write symbols is defined by:

defining a set of variable write parameters;

generating a plurality of candidate write symbols that specify different values for the variable write parameters;

generating a plurality of readout waveforms produced by the plurality of candidate write symbols;

5 analyzing the readout waveforms to determine a set of distinguishable readout waveforms; and

selecting selected ones of the plurality of candidate write symbols that correspond to the distinguishable readout waveforms to be included in the set of write symbols; and

10 writing the data to the medium using the write symbols.

4. A method of recording data on a medium as recited in claim 3 wherein the medium is an optical disc.

5. A method of recording data on a medium as recited in claim 3 wherein the medium is a phase change optical disc.

15 6. A method of recording data on a medium as recited in claim 3 wherein the set of variable write parameters defines characteristics of a sequence of laser pulses.

7. A method of recording data on a medium as recited in claim 3 wherein the set of variable write parameters defines the timing of a sequence of laser pulses.

8. A method of recording data on a medium as recited in claim 3 wherein writing the data to the medium includes inserting guard bands between the write symbols.

20 9. A method of recording data on a medium as recited in claim 3 wherein writing the data to the medium includes inserting guard bands between the write symbols wherein the guard bands are appropriately sized to avoid intersymbol interference.

10. A method of recording data on a medium as recited in claim 3 wherein writing the data to the medium includes inserting guard bands between the write symbols wherein the guard bands are appropriately sized to avoid thermal crosstalk.

25 11. A method of recording data on a medium as recited in claim 3 wherein a matched filter is used to recover the data.

30 12. A method of recording data on a medium as recited in claim 3 wherein a cross correlation coefficient is calculated to recover the data.

13. A method of recording data on a medium as recited in claim 3 wherein a combination of a cross correlation coefficient and comparison of a DC level is used to recover the data.

14. A method of determining a write strategy for writing data to and reading data  
5 from a read/write channel comprising:  
    defining a set of variable write parameters;  
    generating a plurality of candidate write symbols that specify different values for the variable write parameters;  
    generating a plurality of readout waveforms produced by the plurality of  
10 candidate write symbols;  
    analyzing the readout waveforms produced by the marks to determine a set of readout waveforms that match the read/write channel; and  
    selecting selected ones of the plurality of candidate write symbols that correspond to the set of readout waveforms that match the read/write channel to be included in a set  
15 of write symbols that are suitable for mapping to data for the purpose or writing data to the medium.

15. A recording medium having data written on it wherein the data is written using a set of write symbols determined by:  
    defining a set of variable write parameters;  
20      generating a plurality of candidate write symbols that specify different values for the variable write parameters;  
    generating a plurality of readout waveforms produced by the plurality of candidate write symbols;  
    analyzing the readout waveforms produced by the marks to determine a set of  
25 readout waveforms that match a read/write channel that includes the recording medium;  
    and  
    selecting selected ones of the plurality of candidate write symbols that correspond to the readout waveforms that match the read/write channel that includes the recording medium to be included in a set of write symbols that are suitable for mapping to data for  
30 the purpose or writing data to the medium.

16. A method of recording data on a recording medium comprising:  
mapping the data to a set of write symbols wherein each write symbol represents  
more than one bit of the data and wherein the set of write symbols is defined by:

defining a set of variable write parameters;

5 generating a plurality of candidate write symbols that specify different  
values for the variable write parameters;

generating a plurality of readout waveforms produced by the plurality of  
candidate write symbols;

10 analyzing the readout waveforms produced by the marks to determine a  
set of readout waveforms that match a read/write channel that includes the  
recording medium; and

selecting selected ones of the plurality of candidate write symbols that  
correspond to the readout waveforms that match the read/write channel that  
includes the recording medium to be included in the set of write symbols; and  
15 writing the data to the medium using the write symbols.

17. A method of recording data on a medium as recited in claim 16 wherein  
generating a plurality of candidate write symbols that specify different values for the  
variable write parameters includes using a genetic algorithm to generate the plurality of  
candidate write symbols.

20 18. A method of recording data on a medium as recited in claim 16 wherein  
generating a plurality of candidate write symbols that specify different values for the  
variable write parameters includes randomly generating the plurality of candidate write  
symbols.

25 19. A method of recording data on a medium as recited in claim 16 wherein  
generating a plurality of candidate write symbols that specify different values for the  
variable write parameters includes using expert knowledge to generate the plurality of  
candidate write symbols.

20. A method of recording data on a medium as recited in claim 16 wherein  
generating a plurality of candidate write symbols that specify different values for the  
30 variable write parameters includes using expert knowledge to generate an initial set of

candidate write symbols and using a genetic algorithm to refine the initial set of candidate write symbols.

21. A method of recording data on a medium as recited in claim 16 wherein generating a plurality of candidate write symbols that specify different values for the variable write parameters includes selecting a pair waveforms to represent individual channel bits.
22. A method of recording data on a medium as recited in claim 16 wherein generating a plurality of candidate write symbols that specify different values for the variable write parameters includes selecting a pair waveforms to represent individual channel bits and shifting and adding combinations of the waveforms.
23. A method of recording data on a medium as recited in claim 16 wherein generating a plurality of candidate write symbols that specify different values for the variable write parameters includes selecting a pair waveforms to represent individual channel bits wherein the spectrum of the pair of waveforms becomes band-limited and closely resembling the channel's spectrum of signal-to-noise ratio,  $SNR(f)$ .
24. A method of recording data on a medium as recited in claim 16 wherein analyzing the readout waveforms produced by the marks to determine a set of readout waveforms that match a read/write channel that includes the recording medium includes determining ideal readout waveforms follow the read/write channel SNR spectrum
25. A method of recording data on a medium as recited in claim 16 wherein the medium is an optical disc.
26. A method of recording data on a medium as recited in claim 16 wherein the medium is a phase change optical disc.
27. A method of recording data on a medium as recited in claim 16 wherein the set of variable write parameters defines characteristics of a sequence of laser pulses.
28. A method of recording data on a medium as recited in claim 16 wherein the set of variable write parameters defines the timing of a sequence of laser pulses.
29. A method of recording data on a medium as recited in claim 16 wherein a Viterbi detector is used to recover the data.